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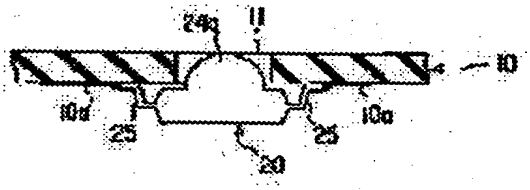
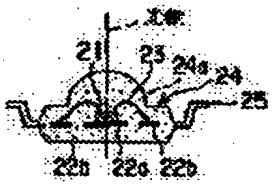
(54) DEVICE FOR MOUNTING OPTICAL COMMUNICATION COMPONENT ON BOARD

(57)Abstract:

PURPOSE: To lower the height of a device where optical communication components are mounted on a wiring board, even in the case of having adopted an object which has a dome-type lens for the package of an optical communication component (an optical spatial transmitter or receiver).



CONSTITUTION: An optical communication component 20 is mounted in the condition that the optical axis passes the inside of the through hole 11 of a wiring board 10, and the optical communication component has a package consisting of an optical communication semiconductor element, which is fixed so that the direction of the optical axis may cross vertically the main face of a lead frame, and transparent resin. And, a dome type lens 24a is so formed integrally as to project in the direction where it separates from the main face of the lead frame besides being in the direction of the optical axis of the optical communication semiconductor element from this package, and at least the tip of this dome type lens is inserted in the through hole of a wiring board, and the outer lead 25 is bent along the direction of the projection of the dome type lens.



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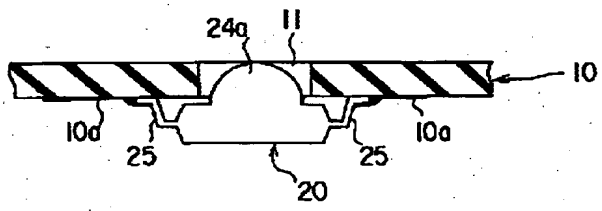
(54)【発明の名称】　光通信部品の基板実装装置

(57)【要約】

【目的】光通信部品（光空間送信器あるいは光空間受信器）のパッケージとしてドーム型レンズ部を有するものを採用した場合でも、光通信部品を配線基板に実装した場合の実装高さを低くする。

【構成】配線基板１０の貫通孔１１の内部を光軸が通過する状態で光通信部品２０が実装されており、光通信部品は、リードフレーム主面に対して光軸方向が垂直に交差するように固定された光通信半導体素子２１および透光性樹脂からなるパッケージ２４を有し、このパッケージから光通信半導体素子の光軸方向でリードフレームの主面から離反する方向に突出するようにドーム型レンズ部２４ａが一体的に形成されており、このドーム型レンズ部の少なくとも先端部が配線基板の貫通孔に挿入されており、外部リード２５がドーム型レンズ部の突出方向に沿って折り曲げられていることを特徴とする。



* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the equipment which mounted the optical space receiver which contained the optical space transmitter or photo detector which built in the light emitting device for performing optical space transmission in a short distance, without starting the substrate mounting equipment of optical-communication parts, especially using an optical fiber in the wiring substrate.
[0002]
[Description of the Prior Art] Drawing 5 shows an example in the state where the conventional optical-communication parts were mounted in the wiring substrate. Here, 50 is a wiring substrate and 60 is optical-communication parts (an optical space transmitter or optical space receiver).
[0003] Drawing 6 (a) and (b) take out the optical-communication parts in drawing 5 , are the plan and a side elevation and show the cross section which meets the C-C line in drawing 6 (a) to drawing 6 (c). The optical-communication semiconductor device fixed so that, as for 62, the direction of an optical axis might cross [as opposed to / the above-mentioned leadframe principal plane / in 61] perpendicularly in drawing 6 as opposed to the bed section of a leadframe (a light emitting device or photo detector), The mould package which a bonding wire and 64 become from a translucency resin in 63, The dome type lens section projected in the direction which 64a is formed in one with the above-mentioned package, and deserts the principal plane of the aforementioned leadframe in the extended direction of the optical axis of the aforementioned optical-communication semiconductor device, and 65 are the external leads of the aforementioned leadframe.
[0004] As described above, since the conventional optical-communication parts are mounted on the wiring substrate so that a leadframe principal plane may be in the state of turning to an opposite direction with the component side of the wiring substrate 50, mounting height (larger a little than the height from a wiring substrate base to the nose of cam of the dome type lens section of the package on a wiring substrate, i.e., the sum of the thickness of the wiring substrate 50 and the thickness of the whole package of the optical-communication parts 60) becomes high.
[0005] In addition, in the case of the optical space transmitter (or optical space receiver) which adopted the package without dome type lens section 64a, a lens is prepared as another parts, a means to combine this lens with an optical space transmitter (or optical space receiver) optically is needed for it, the equipment configuration as the whole becomes complicated, and cost becomes high.
[0006]
[Problem(s) to be Solved by the Invention] The equipment which mounted a conventional optical space transmitter or a conventional optical space receiver in the wiring substrate as described above had the problem that the mounting height to the nose of cam of the dome type lens section of a package became high.
[0007] It was made that this invention should solve the above-mentioned trouble, and even when what has the dome type lens section as a package of optical-communication parts (an optical space transmitter or optical space receiver) is adopted, it aims at offering the substrate mounting equipment of the optical-communication parts which can make low the mounting height at the time of mounting optical-communication parts in a wiring substrate.
[0008]
[Means for Solving the Problem] The wiring substrate which has the breakthrough of a size predetermined in the substrate mounting equipment of the optical-communication parts of this invention, The optical-communication parts mounted in the state where an optical axis passes through the interior of the breakthrough of this wiring substrate are provided. the above-mentioned optical-communication parts A leadframe and the optical-communication semiconductor device fixed so that the direction of an optical axis might cross perpendicularly to the principal plane of this leadframe, It consists of a translucency resin by which mould molding was carried out so that a part of this optical-communication semiconductor device and above-mentioned leadframe might be covered. The dome type lens section is formed in one so that it may project in the direction which deserts the principal plane of the aforementioned leadframe in the direction of an optical axis of the aforementioned optical-communication semiconductor device. It projects from the package by which the point was inserted at least in the breakthrough of the aforementioned wiring substrate and this package of this dome type lens section, and is characterized by having the external lead bent along the protrusion direction of the aforementioned dome type lens section.
[0009]
[Function] Since the leadframe principal plane of optical-communication parts counters a wiring substrate and the point is mounted at least in the state of the dome type lens section of optical-communication parts where it inserted in the breakthrough of a wiring substrate, it becomes possible to make mounting height lower than before.

[0010]
[Example] Hereafter, with reference to a drawing, the example of this invention is explained in detail. Drawing 1 is the side elevation cutting and showing some substrate mounting equipments of the optical-communication parts concerning the 1st example of this invention.
[0011] Here, the wiring substrate 10 has the breakthrough 11 of a predetermined size, and the optical-communication parts (an optical space transmitter or optical space receiver) 20 are mounted in the state where the optical axis passes through the interior of the breakthrough of the above-mentioned wiring substrate.
[0012] Drawing 2 (a) and (b) take out the optical-communication parts 20 in drawing 1 , are the plan and a side elevation and show the cross section which meets the C-C line in drawing 2 (a) to drawing 2 (c). In drawing 2 , 21 is an optical-communication semiconductor device (a light emitting device or photo detector), and it is being fixed to bed section 22a of a leadframe so that the direction of an optical axis may cross perpendicularly to a leadframe principal plane. 23 is a bonding wire which connects electrically between the above-mentioned optical-communication semiconductor device 21 and inner lead section 22b of the aforementioned leadframe.
[0013] 24 is a package which consists of a translucency resin by which mould molding was carried out so that bed section 22a of the aforementioned optical-communication semiconductor device 21 and a leadframe and inner lead section 22b might be covered.
[0014] It is the dome type lens section of the above-mentioned package, 24a is formed in the package 24 in one so that it may project in the direction which deserts the aforementioned leadframe principal plane in the direction of an optical axis of the aforementioned optical-communication semiconductor device 21, and it is formed in order to centralize a light energy (the radiant power output of a light emitting device, or light-receiving input of a photo detector) focusing on an optical axis. As for this dome type lens section 24a, the point (this example almost all) is inserted in the breakthrough 11 of the aforementioned wiring substrate 10 at least.
[0015] 25 is the external lead of the aforementioned leadframe, it projects from the above-mentioned package 24, and an optical axis and parallel bend along the protrusion direction of the aforementioned dome type lens section 24a, and the point is soldered to them at wiring section 10a of the aforementioned wiring substrate 10.
[0016] The above-mentioned optical-communication parts 20 are manufactured like the usual manufacturing process through the process of the die bonding of the optical-communication semiconductor device 21, wire bonding, packaging, lead plating, lead cutting, and lead foaming. However, in this example, the direction of lead foaming differs from the thing of the conventional example.
[0017] According to the substrate mounting equipment of the optical-communication parts of the 1st example of the above, the principal plane of the leadframe 22 of the optical-communication parts 20 counters the wiring substrate 10. And since dome type lens section 24a of the optical-communication parts 20 is mounted in the state where it inserted in the breakthrough 11 of the wiring substrate 10, mounting height becomes almost equal to the sum of the thickness of the wiring substrate 10, and the thickness of the flat portion of the package 24 of the optical-communication parts 20, and becomes low from before.
[0018] Drawing 3 is the side elevation cutting and showing some substrate mounting equipments of the optical-communication parts concerning the 2nd example of this invention. It differs in that it has processed so that this 2nd example may form the metallic coating 12 which can carry out total reflection of the light all over the inside of the breakthrough 11 of the wiring substrate 10 compared with the 1st example mentioned above with reference to drawing 1 , and since others are the same, the same sign is given to the same portion as the inside of drawing 1 .
[0019] When metal through hole processing and plating processing are performed as an example of the above-mentioned metallic-coating processing when the wiring substrate 10 is a product made of a resin, and the wiring substrate 10 is a product made from a ceramic, it is ****** about metallizing processing and plating processing.
[0020] According to such composition, the same effect as the 1st example mentioned above is acquired, and also it becomes possible to raise the optical coupling efficiency of optical-communication parts. Drawing 4 is the side elevation cutting and showing some substrate mounting equipments of the optical-communication parts concerning the 3rd example of this invention.
[0021] As for the package 44 of (1) optical-communication parts 40, the dome type lens section is omitted compared with the 2nd example which mentioned this 3rd example above with reference to drawing 2 . That is, are formed so that the effective-area product of the breakthrough 13 of a point and (2) wiring substrate 10 which is the flat type package 44 may become large gradually toward the component-side side of the optical-communication parts 40 to an opposite side side. In this example, the points currently formed so that a breakthrough inside may incline in the shape of a straight line in the cross section of the breakthrough vertical section direction differ, and since others are the same, the same sign is given to the same portion as the inside of drawing 2 .
[0022] According to such composition, when metallic coating 12 is processed by the inside of a breakthrough 13 in the state where the optical-communication parts 40 were mounted, in the state where an optical axis passes through the interior of the breakthrough 13 of the wiring substrate 10, the same effect as the aforementioned dome type lens section is acquired. Furthermore, in connection with using the package 44 to which the dome type lens section was abbreviated, the stress of the resin package to the optical-communication semiconductor device inside a package can become small, degradation of an optical-communication semiconductor device can be suppressed, and the reliability can be raised. In addition, in the 3rd example of the above, you may change so that a breakthrough inside may become a parabolic (it is got blocked and a breakthrough inside is a paraboloid) in the cross section of the breakthrough vertical section direction.
[0023]
[Effect of the Invention] As mentioned above, even when what has the dome type lens section as a package of optical-communication parts (an optical space transmitter or optical space receiver) is adopted according to this invention, the

substrate mounting equipment of the optical-communication parts which can make low the mounting height at the time of mounting optical-communication parts in a wiring substrate can be realized.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Substrate mounting equipment of the optical-communication parts characterized by providing the following. The wiring substrate which has the breakthrough of a predetermined size Providing the optical-communication parts mounted in the state where an optical axis passes through the interior of the breakthrough of this wiring substrate, the above-mentioned optical-communication parts are leadframes. The optical-communication semiconductor device fixed so that the direction of an optical axis might cross perpendicularly to the principal plane of this leadframe The external lead which consisted of a translucency resin by which mould molding was carried out so that a part of this optical-communication semiconductor device and above-mentioned leadframe may cover, the dome type lens section was formed in one, and was projected from the package by which the point was inserted at least in the aforementioned breakthrough and this package of this dome type lens section so that it may project in the direction which deserts the principal plane of the aforementioned leadframe in the direction of an optical axis of the aforementioned optical-communication semiconductor device, and was bent along the protrusion direction of the aforementioned dome type lens

[Claim 2] It is substrate mounting equipment of the optical-communication parts characterized by performing metallic-coating processing to the inside of the breakthrough in the substrate mounting equipment of an optical-communication part according to claim 1, as for the aforementioned wiring substrate.

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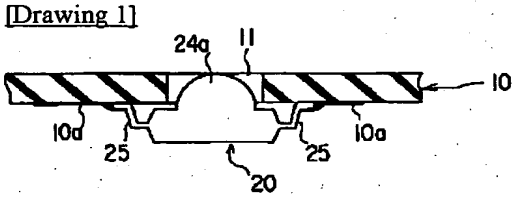
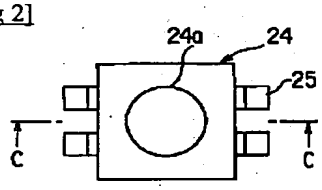
DRAWINGS

[Drawing 1]



[Drawing 2]

(a)



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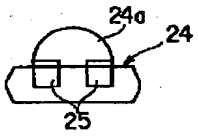

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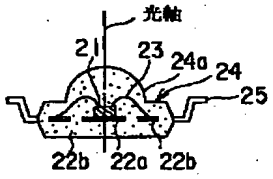
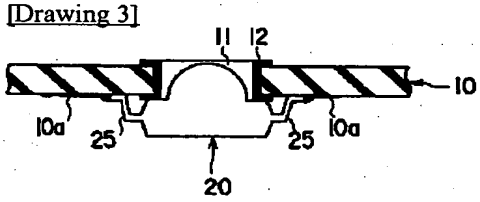
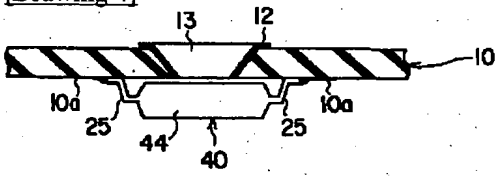


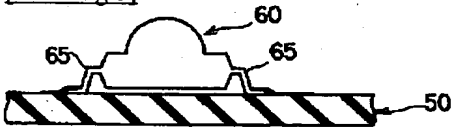
[Drawing 3]



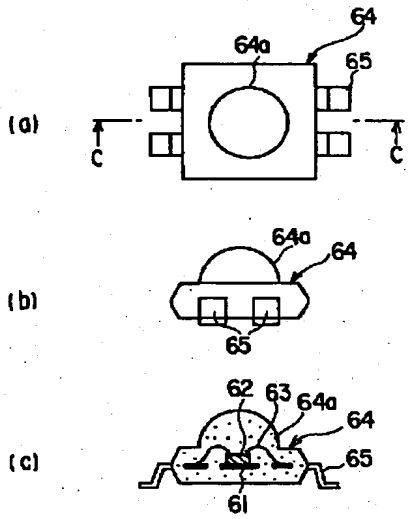
[Drawing 4]



[Drawing 5]



[Drawing 6]



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